

Application No. 10/809,215

Amendments to the Claims:

This listing of claims will replace all prior versions and listings of claims in the application.

Listing of Claims:

1. (Canceled)
2. (Currently amended) ~~The~~ A solid-state imaging apparatus ~~according to claim 1,~~
~~wherein comprising:~~
 - a plurality of photosensitive cells disposed in a matrix in a photosensitive region on a semiconductor substrate; and
 - a driving unit for driving the plurality of photosensitive cells,
wherein each of the photosensitive cells includes:
 - a photodiode formed to be exposed on a surface of the semiconductor substrate,
for accumulating signal charge obtained by subjecting incident light to photoelectric exchange;
 - a transfer transistor formed on the semiconductor substrate, for transferring the signal charge accumulated in the photodiode;
 - a floating diffusion layer formed on the semiconductor substrate, for temporarily accumulating the signal charge transferred by the transfer transistor; and
 - an amplifier transistor formed on the semiconductor substrate, for amplifying the signal charge temporarily accumulated in the floating diffusion layer,
wherein a source/drain diffusion layer provided in the amplifier transistor is covered with a salicide layer,
the floating diffusion layer is formed to be exposed on the surface of the semiconductor substrate, and
 - an impurity concentration of the floating diffusion layer is lower than an impurity concentration of the source/drain diffusion layer of the amplifier transistor.

Application No. 10/809,215

3. (Currently amended) ~~The~~ A solid-state imaging apparatus ~~according to claim 1,~~
~~wherein comprising:~~

a plurality of photosensitive cells disposed in a matrix in a photosensitive region
on a semiconductor substrate; and

a driving unit for driving the plurality of photosensitive cells,

wherein each of the photosensitive cells includes:

a photodiode formed to be exposed on a surface of the semiconductor substrate,
for accumulating signal charge obtained by subjecting incident light to photoelectric
exchange;

a transfer transistor formed on the semiconductor substrate, for transferring the
signal charge accumulated in the photodiode;

a floating diffusion layer formed on the semiconductor substrate, for temporarily
accumulating the signal charge transferred by the transfer transistor; and

an amplifier transistor formed on the semiconductor substrate, for amplifying the
signal charge temporarily accumulated in the floating diffusion layer,

wherein a source/drain diffusion layer provided in the amplifier transistor is
covered with a salicide layer,

the floating diffusion layer is formed to be exposed on the surface of the
semiconductor substrate,

each of the photosensitive cells further includes a reset transistor for resetting the
floating diffusion layer,

the driving unit includes:

a vertical driver circuit for simultaneously driving the transfer transistor and the
reset transistor in a vertical direction;

a noise suppressing circuit for obtaining a signal output to a plurality of vertical
signal lines disposed in a vertical direction in the photosensitive region; and

a horizontal driver circuit for outputting a signal from the noise suppressing
circuit in a time series by successively switching a plurality of horizontal transistors
disposed in a horizontal direction, and

Application No. 10/809,215

an impurity concentration of the floating diffusion layer is lower than an impurity concentration of a source/drain diffusion layer provided in a plurality of transistors constituting the vertical driver circuit and the horizontal driver circuit.

4. (Original) The solid-state imaging apparatus according to claim 3, wherein the source/drain diffusion layer provided in the plurality of transistors constituting the vertical driver circuit and the horizontal driver circuit is covered with a salicide layer.
5. (Currently amended) The solid-state imaging apparatus according to claim ~~[[1]]~~ 2, wherein the transfer transistor and the amplifier transistor are composed of an n-type MOS transistor.
6. (Original) The solid-state imaging apparatus according to claim 3, wherein the vertical driver circuit and the horizontal driver circuit are composed of a dynamic logic circuit.
7. (Original) The solid-state imaging apparatus according to claim 3, wherein an impurity concentration of a source/drain diffusion layer of a part of the plurality of transistors constituting the vertical driver circuit and the horizontal driver circuit is lower than an impurity concentration of a source/drain diffusion layer of another part of the plurality of transistors constituting the vertical driver circuit and the horizontal driver circuit.
8. (Original) The solid-state imaging apparatus according to claim 3, wherein a source/drain diffusion layer of a part of the plurality of transistors constituting the vertical driver circuit and the horizontal driver circuit is formed to be exposed on a surface of the semiconductor substrate, and a source/drain diffusion layer of another part of the plurality of transistors constituting the vertical driver circuit and the horizontal driver circuit is covered with a salicide layer.

Application No. 10/809,215

9. (Currently amended) The solid-state imaging apparatus according to claim [[1]] 2, wherein an impurity concentration of the floating diffusion layer is $1 \times 10^{18} \text{ cm}^{-3}$ or less.

10. (Withdrawn) A method for producing a solid-state imaging apparatus comprising:
a plurality of photosensitive cells disposed in a matrix in a photosensitive region on a semiconductor substrate; and

a driving unit for driving the plurality of photosensitive cells,
wherein each of the photosensitive cells includes:

a photodiode formed to be exposed on a surface of the semiconductor substrate, for accumulating signal charge obtained by subjecting incident light to photoelectric exchange;

a transfer transistor formed on the semiconductor substrate, for transferring the signal charge accumulated in the photodiode;

a floating diffusion layer formed on the semiconductor substrate, for temporarily accumulating the signal charge transferred by the transfer transistor; and

an amplifier transistor formed on the semiconductor substrate, for amplifying the signal charge temporarily accumulated in the floating diffusion layer,

wherein a source/drain diffusion layer provided in the amplifier transistor is covered with a salicide layer, and the floating diffusion layer is formed to be exposed on the surface of the semiconductor substrate,

the method comprising:

forming the photodiode, the transfer transistor, and the amplifier transistor on the semiconductor substrate;

forming a resist in a predetermined pattern so as to cover the photodiode, the transfer transistor, and the amplifier transistor;

implanting ions into the semiconductor substrate using the resist as a mask so as to form the floating diffusion layer;

removing the resist and forming a salicide blocking film so as to cover the floating diffusion layer and the photodiode;

forming a source/drain diffusion layer of the amplifier transistor; and

Application No. 10/809,215

forming a salicide layer so as to cover the source/drain diffusion layer of the amplifier transistor.

11. (Withdrawn) The method for producing the solid-state imaging apparatus according to claim 10, wherein an impurity concentration of the floating diffusion layer is lower than an impurity concentration of the source/drain diffusion layer of the amplifier transistor.

12. (Withdrawn) A method for producing a solid-state imaging apparatus comprising:
a plurality of photosensitive cells disposed in a matrix in a photosensitive region on a semiconductor substrate; and

a driving unit for driving the plurality of photosensitive cells,
wherein each of the photosensitive cells includes:

a photodiode formed to be exposed on a surface of the semiconductor substrate, for accumulating signal charge obtained by subjecting incident light to photoelectric exchange;

a transfer transistor formed on the semiconductor substrate, for transferring the signal charge accumulated in the photodiode;

a floating diffusion layer formed on the semiconductor substrate, for temporarily accumulating the signal charge transferred by the transfer transistor; and

an amplifier transistor formed on the semiconductor substrate, for amplifying the signal charge temporarily accumulated in the floating diffusion layer,

wherein a source/drain diffusion layer provided in the amplifier transistor is covered with a salicide layer, and the floating diffusion layer is formed to be exposed on the surface of the semiconductor substrate,

the method comprising:

forming a resist in a predetermined pattern on the semiconductor substrate;

implanting ions using the resist as a mask so as to form the photodiode;

removing the resist and forming the transfer transistor and the amplifier transistor on the semiconductor substrate;

forming a first salicide blocking film so as to cover the photodiode;

Application No. 10/809,215

implanting ions into the semiconductor substrate so as to form the floating diffusion layer and the source/drain diffusion layer of the amplifier transistor;
forming a second salicide blocking film so as to cover the floating diffusion layer;
and
forming a salicide layer so as to cover the source/drain diffusion layer of the amplifier transistor.

13. (Withdrawn) The method for producing the solid-state imaging apparatus according to claim 12, wherein an impurity concentration of the floating diffusion layer is lower than an impurity concentration of the source/drain diffusion layer of the amplifier transistor.